6.8 Northern White Cedar-(Hardwood) Forests

Thuja occidentalis / Abies balsamea - Acer spicatum Forest (White Cedar - Boreal Conifer Mesic Forest)

COMMON NAME	Northern White-cedar / Balsam Fir - Mountain Maple Forest
SYNONYM	White Cedar - Boreal Conifer Mesic Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	THUJA OCCIDENTALIS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community occurs in small patches in localized areas throughout the park, typically on moderate slopes. In the southwestern park of the park it occurs on more flat terrain.

Globally

This community is found in northern Minnesota, northern Wisconsin, northern Michigan, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

In the southwest part of the park, this type usually occurs on flat terrain over deep, poorly drained silt clay loams. In the rest of the park, this community is commonly found on gently sloping terrain, often on toeslopes, located just above wetland communities. There is usually very little surficial bedrock. The soils are typically 7-10 cm loams over dense lacustrine clay. In some cases, a shallow build up of well decomposed peat may be present. Hummocks and hollows formed from fallen trees and build up of organic debris may be absent or well developed.

Globally

This community is found on gentle wet-mesic slopes to very steep well-drained slopes (MN NHP 1993). The predominant aspect is north to northeast. Soils are moderately deep to deep (50-100 cm), calcareous, coarse to fine textured, and often contain boulders at the surface (Ohmann and Ream 1971, Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tall shrub	*Abies balsamea, Acer spicatum*
Short shrub	*Rubus pubescens*
Forb	*Mitella nuda, Aralia nudicaulis*
Fern	*Dryopteris carthusiana, Equisetum sylvaticum*
Nonvascular	*Rhytidiadelphus triquetrus, Calliergon* spp., *Mniaceae*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tree subcanopy	*Abies balsamea*

CHARACTERISTIC SPECIES

Voyageurs National Park

Thuja occidentalis, Abies balsamea, Acer spicatum, Rubus pubescens

Globally
Thuja occidentalis, Abies balsamea, Acer spicatum, Coptis trifolia

VEGETATION DESCRIPTION
Voyageurs National Park
The White Cedar-Boreal Conifer Forest generally exhibits a completely closed canopy of *Thuja occidentalis* (90-100% cover). In rare cases, canopy cover may be as low as 60%. *Fraxinus nigra* and, less commonly, *Populus balsamifera* and *Populus tremuloides* can also occur in the canopy or emergent layers at less than 25% cover. There is no sub-canopy, but occasionally a tall shrub layer occurs with about 25% cover of *Abies balsamea*. *Acer spicatum* can also occur in canopy openings. The cover of herbaceous species is highly variable, ranging from 10-90%. *Rubus pubescens, Dryopteris carthusiana, Mitella nuda, Equisetum sylvaticum,* and *Aralia nudicaulis* are the most abundant. The dominant bryophytes are *Rhytidiadelphus triquetrus, Climacium dendroides, Calliergon cordifolium, Calliergon giganteum,* and mosses in the *Mniaceae* (the *Mnium* family). The cover of this nonvascular strata can range from virtually non-existent to about 40% cover.

Globally
The overstory is dominated by coniferous trees, with or without a substantial deciduous component. *Thuja occidentalis* is the most abundant tree and may occur in pure stands. Usually there are other canopy species, especially *Abies balsamea, Betula papyrifera, Picea glauca, Picea mariana, Populus tremuloides*, and *Pinus strobus*. There is usually an abundant shrub/sapling layer with saplings of *Thuja occidentalis* and *Abies balsamea* along with the shrubs *Acer spicatum, Corylus cornuta, Linnaea borealis, Lonicera canadensis, Rubus pubescens*, and *Sorbus decora*. The ground layer is typically diverse on mesic to wet-mesic stands and less so on steep drier stands. Wet-mesic stands can contain a hummock and hollow topography, with a seasonally saturated hydrology. Typical species include *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Mitella nuda*, and *Trientalis borealis*. Mosses include *Drepanocladus uncinatus, Hylocomium splendens, Plagiomnium cuspidatum, Pleurozium schreberi, Ptilium crista-castrensis*, and *Rhytidiadelphus triquestrus* and, in wetter phases of the type, *Sphagnum* spp (Ohmann and Ream 1971, Sims *et al.* 1989, Chambers *et al.* 1997).

CONSERVATION RANK G4.

DATABASE CODE CEGL002449

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy of *Thuja occidentalis* without *Alnus incana* shrubs or *Sphagnum* spp. moss. In contrast to the White Cedar/Alder Swamp community, the White-Cedar Boreal Conifer Forest generally does not contain *Alnus incana* in the shrub layer or significant cover of *Sphagnum* spp. moss. Intermediate stands, however, do exist. When *Populus* spp. are present in the emergent layer or canopy approaching 25% relative cover, this community can grade into the White Cedar-Yellow Birch Forest.

Fraxinus nigra is commonly found mixed in the canopy with *Thuja occidentalis*. When cover of *Fraxinus nigra* in the canopy is greater than 25%, the stand becomes a White Cedar-Black Ash Swamp. The White Cedar-Black Ash Swamp is typically wetter than the White Cedar Boreal Forest, often containing standing water in the hollows and *Alnus incana* shrubs. Many stands intermediate between the two types exist.

Globally
Browsing by deer can be a serious hindrance to *Thuja occidentalis* reproduction (MN NHP 1993).

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.